crystallizing said semiconductor film by heating in a way that causes said catalyst metal to diffuse through the semiconductor film and function to promote [a] the crystallization of [a material of] the semiconductor film;

forming a gettering layer in contact with said semiconductor film after the crystallization, said gettering layer including [phosphorous] phosphorus; and

[thermally annealing] heating said semiconductor film and said gettering layer at a temperature not lower than 500°C in order to getter the catalyst metal in said semiconductor film using said gettering layer.

27. (Amended) A method according to claim ~~26~~ 1 wherein said [semiconductor] device is a photoelectric conversion device.

28. (Amended) A method according to claim 26 wherein said [thermally annealing] heating is continued for 1-4 hours.

29. (Amended) A method according to claim ~~26~~ 1 wherein said gettering layer comprises a [phosphorous] phosphorus silicate glass containing [phosphorous] phosphorus at a concentration of 1 to 30 wt%.



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30. (Amended) A method according to claim 26 wherein said gettering layer comprises silicon containing [phosphorous] phosphorus at a concentration of 0.1 to 10 wt%.

31. (Amended) A method according to claim 26 wherein said [thermal annealing] heating is conducted at a temperature not higher than 800°C.

34. (Amended) A method of manufacturing a [semiconductor] device comprising:

providing a substantially intrinsic semiconductor film on an insulating surface[, said semiconductor film comprising silicon doped with boron at a concentration of 0.001-0.1 atm%];

providing [at least a part of] said semiconductor film with a catalyst metal-containing material;

crystallizing said semiconductor film by heating in a way that causes said catalyst metal to diffuse through the semiconductor film and functions to promote [a] the crystallization of said semiconductor film;

forming a gettering layer in contact with said semiconductor film after the crystallization, said gettering layer including [phosphorous] phosphorus; and

[thermally annealing] heating said semiconductor film and said gettering layer in order to getter the catalyst metal in said semiconductor film by said gettering layer.

35. (Amended) A method according to claim 34 wherein said [semiconductor] device is a photoelectric conversion device.

36. (Amended) A method according to claim 34 wherein said [thermal annealing] heating is continued for 1-4 hours.

37. (Amended) A method according to claim 34 wherein said gettering layer comprises a [phosphorous] phosphorus silicate glass containing [phosphorous] phosphorus at a concentration of 1 to 30 wt%.

38. (Amended) A method according to claim 34 wherein said gettering layer comprises silicon containing [phosphorous] phosphorus at a concentration of 0.1 to 10 wt%.

41. (Amended) A method according to claim 34 wherein said [thermal annealing] heating is conducted within a temperature from 500°C to 800°C.

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~~42~~. (Amended) A method of manufacturing a [semiconductor] device comprising:

providing a semiconductor film on an insulating surface;

providing a catalyst metal-containing material on [at least part of] said semiconductor film;

crystallizing said semiconductor film by heating in a way ~~that~~ causes said catalyst metal to diffuse through the semiconductor film and function to promote [a] the crystallization of said semiconductor film;

forming a gettering layer in contact with said semiconductor film after the crystallization, said gettering layer including [phosphorous] phosphorus; and

[thermally annealing] heating said semiconductor film and said gettering layer in a nitrogen atmosphere in order to getter the catalyst metal contained in said semiconductor film by said gettering layer.

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~~43~~. (Amended) A method according to claim ~~42~~ wherein said [semiconductor] device is a photoelectric conversion device.

44. (Amended) A method according to claim 42 wherein said [thermal annealing] heating is conducted for 1-4 hours.

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45. (Amended) A method according to claim 42 wherein said gettering layer comprises a [phosphorous] phosphorus silicate glass containing [phosphorous] phosphorus at a concentration of 1 to 30 wt%.

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46. (Amended) A method according to claim 42 wherein said gettering layer comprises silicon containing [phosphorous] phosphorus at a concentration of 0.1 to 10 wt%.

50. (Amended) A method according to claim 42 wherein said [thermal annealing] heating is conducted within a temperature from 500°C to 800°C.

51. (Amended) A method of manufacturing a [semiconductor] device having [an intrinsic to doped] a junction, said method comprising:

providing a semiconductor film comprising amorphous silicon on an insulating surface;

providing a catalyst metal-containing material on [at least part of] said semiconductor film;

crystallizing said semiconductor film by heating in a way that causes said metal to diffuse through the semiconductor film and to promote [a] the crystallization thereof;



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forming a gettering layer in contact with said semiconductor film after the crystallization, said gettering layer including phosphorus;

[thermally annealing] heating said semiconductor film and said gettering layer at a temperature not lower than 500°C in order to getter the metal included in said semiconductor film by said gettering layer; and

forming a doped [silicon] semiconductor film on said semiconductor film to form [an intrinsic to doped] a junction.

26 ~~52~~. (Amended) A method according to claim 25 ~~51~~ wherein said [semiconductor] device is a photoelectric conversion device.

53. (Amended) A method according to claim 51 wherein said [thermally annealing] heating is conducted for 1-4 hours.

28 ~~54~~. (Amended) A method according to claim 25 ~~51~~ wherein said gettering layer comprises a [phosphorous] phosphorus silicate glass containing [phosphorous] phosphorus at a concentration of 1 to 30 wt%.



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55. (Amended) A method according to claim 51 wherein said gettering layer comprises silicon containing [phosphorous] phosphorus at a concentration of 0.1 to 10 wt%.

56. (Amended) A method according to claim 51 wherein said [thermal annealing] heating is conducted at a temperature not higher than 800°C.

59. (Amended) A method of manufacturing a [semiconductor] device having a [doped to intrinsic] junction, said method comprising:

providing a substantially intrinsic semiconductor film on an insulating surface[, said semiconductor film comprising amorphous silicon doped with boron at a concentration of 0.0001-0.1 atm%];

providing a catalyst metal [at least partly] on said semiconductor [material] film;

crystallizing said semiconductor film by heating to cause said catalyst metal to diffuse through the semiconductor film and to promote [a] the crystallization of said semiconductor film;

forming a gettering layer in contact with said semiconductor film after the crystallization thereof, said gettering layer including phosphorus;

[thermally annealing] heating said semiconductor film and said gettering layer in order to getter the catalyst metal in said semiconductor film by said gettering layer; and

forming a [doped to intrinsic] junction using said intrinsic semiconductor film.

60. (Amended) A method according to claim 59 wherein said [semiconductor] device is a photoelectric conversion device.

61. (Amended) A method according to claim 59 wherein said [thermal annealing] heating is continued for 1-4 hours.

62. (Amended) A method according to claim 59 wherein said gettering layer comprises a [phosphorous] phosphorus silicate glass containing [phosphorous] phosphorus at a concentration of 1 to 30 wt%.

63. (Amended) A method according to claim 59 wherein said gettering layer comprises silicon containing [phosphorous] phosphorus at a concentration of 0.1 to 10 wt%.

66. (Amended) A method according to claim 59 wherein said [thermal annealing] heating is conducted within a temperature from 500°C to 800°C.

67. (Amended) A method of manufacturing a [semiconductor] device having a [doped to intrinsic] junction, said method comprising:

providing a semiconductor film comprising amorphous silicon formed on an insulating surface;

providing a catalyst metal-containing material [at least partly] on said semiconductor film;

crystallizing said semiconductor film by heating in a way that causes said catalyst metal to diffuse through the semiconductor film and function to promote the crystallization of said semiconductor film;

forming a gettering layer in contact with said semiconductor film after the crystallization, said gettering layer including phosphorus; and

[thermally annealing] heating said semiconductor film and said gettering layer in a nitrogen atmosphere in order to getter the catalyst metal contained in said semiconductor film by said gettering layer; and

forming [an intrinsic-to-doped] a junction on said semiconductor film.

68. (Amended) A method according to claim 67 wherein said [semiconductor] device is a photoelectric conversion device.

69. (Amended) A method according to claim 67 wherein said [thermal annealing] heating is continued for 1-4 hours.

70. (Amended) A method according to claim 67 wherein said gettering layer comprises a [phosphorous] phosphorus silicate glass containing [phosphorous] phosphorus at a concentration of 1 to 30 wt%.

71. (Amended) A method according to claim 67 wherein said gettering layer comprises silicon containing [phosphorous] phosphorus at a concentration of 0.1 to 10 wt%.

75. (Amended) A method according to claim 67 wherein said [thermal annealing] heating is conducted within a temperature from 500°C to 800°C.

76. (Amended) A method of manufacturing a [semiconductor] device, comprising:

providing a semiconductor film [over a substrate] on an insulating surface;

forming a catalyst metal-containing material, said catalyst being a material which facilitates crystallization of said semiconductor film to be formed more easily, but which when present in a final product of the [semiconductor] device will degrade operation of the [semiconductor] device;

crystallizing said semiconductor film by heating in a way that causes said catalyst metal-containing material to diffuse into at least a part of the semiconductor film, said catalyst metal containing material when so diffused functioning to facilitate said crystallization;

forming a [further processing layer] gettering layer in contact with said semiconductor film, said [further processing layer] gettering layer including [a material that reduces a concentration of said catalyst metal-containing material] phosphorus; and

processing said semiconductor film and said [further processing layer] gettering layer to reduce a concentration of said catalyst metal in said semiconductor film.

51~~75~~. (Amended) A method as in claim ~~47~~ 76, wherein ~~said~~ the catalyst material allows said crystallization to occur at a lower temperature than a temperature of crystallization without said catalyst material.

Please add new claims 81- 102 as follows.

81. (New) A method of manufacturing a device comprising:providing a semiconductor film on an insulating surface;

providing said semiconductor film with a metal containing material;

crystallizing said semiconductor film by heating in a way that causes said metal to diffuse through the semiconductor film and functions to promote the crystallization of the semiconductor film;

introducing phosphorus into a portion of said crystallized semiconductor film by plasma doping;

heating said semiconductor film after introducing said phosphorus at a temperature not lower than 500°C in order to getter the metal in said semiconductor film.

82. (New) A method of manufacturing a device comprising:



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providing a semiconductor film doped with boron at a concentration of 0.001-0.1 atm% on an insulating surface;

providing said semiconductor film with a metal containing material;

crystallizing said semiconductor film by heating in a way that causes said metal to diffuse through the semiconductor film and functions to promote the crystallization of said semiconductor film;

forming a gettering layer in contact with said semiconductor film after the crystallization, said gettering layer including phosphorus; and

heating said semiconductor film and said gettering layer in order to getter the catalyst metal in said semiconductor film by said gettering layer.

83. (New) A method of manufacturing a device comprising:

providing a substantially intrinsic semiconductor film on an insulating surface;

providing said semiconductor film with a metal-containing material;

crystallizing said semiconductor film by heating in a way that causes said metal to diffuse through the semiconductor film

and functions to promote the crystallization of said semiconductor film;

introducing phosphorus into a portion of the crystallized semiconductor film by plasma doping;

heating said semiconductor film after introducing phosphorus in order to getter the metal in said semiconductor film.

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84. (New) A method of manufacturing a device comprising:

providing a semiconductor film doped with boron at a concentration of 0.001-0.1 atm% on an insulating surface;

providing said semiconductor film with a metal containing material;

crystallizing said semiconductor film by heating in a way that causes said metal to diffuse through the semiconductor film and functions to promote the crystallization of said semiconductor film;

introducing phosphorus into a portion of the crystallized semiconductor film by plasma doping;

heating said semiconductor film after introducing phosphorus in order to getter the metal in said semiconductor film.

85. (New) A method of manufacturing a device comprising:

providing a semiconductor film on an insulating surface;

providing a metal containing material on said semiconductor film;

crystallizing said semiconductor film by heating in a way that causes said metal to diffuse through the semiconductor film and functions to promote the crystallization of said semiconductor film;

introducing phosphorus into a portion of the crystallized semiconductor film by plasma doping;

heating said semiconductor film in a nitrogen atmosphere after introducing phosphorus in order to getter the metal contained in said semiconductor film.

86. (New) A method of manufacturing a device having a junction, said method comprising:

providing a semiconductor film doped with boron at a concentration of 0.001-0.1 atm% on an insulating surface;

providing a metal on said semiconductor film;

crystallizing said semiconductor film by heating to cause said metal to diffuse through the semiconductor film and to promote the crystallization of said semiconductor film;

forming a gettering layer in contact with said semiconductor film after the crystallization thereof, said gettering layer including phosphorus;

heating said semiconductor film and said gettering layer in order to getter the catalyst metal in said semiconductor film by said gettering layer; and

forming a junction using an intrinsic semiconductor film.

87. (New) A method of manufacturing a device having a junction, said method comprising:

providing a substantially intrinsic semiconductor film on an insulating surface;

providing a metal on said semiconductor film;

crystallizing said semiconductor film by heating to cause said metal to diffuse through the semiconductor film and to promote the crystallization of said semiconductor film;

introducing phosphorus into a portion of the crystallized semiconductor film by plasma doping;

heating said semiconductor film after introducing phosphorus in order to getter the metal in said semiconductor film by said gettering layer; and

forming a junction using a doped semiconductor film.

88. (New) A method of manufacturing a device having a junction, said method comprising:

providing a semiconductor film doped with boron at a concentration of 0.001-0.1 atm% on an insulating surface;

providing a metal on said semiconductor film;

crystallizing said semiconductor film by heating to cause said metal to diffuse through the semiconductor film and to promote the crystallization of said semiconductor film;

introducing phosphorus into a portion of the crystallized semiconductor film by plasma doping;

heating said semiconductor film and said gettering layer in order to getter the catalyst metal in said semiconductor film by said gettering layer; and

forming a junction using an intrinsic semiconductor film.

89. (New) A method of manufacturing a device comprising the steps of:

providing a semiconductor film on an insulating surface;

forming a metal containing material, said metal being a material which facilitates crystallization of said semiconductor film to be formed more easily, but which when present in a final product of the device will degrade operation of the device;

crystallizing said semiconductor film by heating in a way that causes said metal containing material to diffuse into at least a part of the semiconductor film, said metal containing material when so diffused functioning to facilitate said crystallization;

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introducing phosphorus into a portion of the crystallized semiconductor film by plasma doping;

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processing said semiconductor film after introducing phosphorus to reduce a concentration of said metal in said semiconductor film.

90. (New) A method according to any one of claims 26, 34, 42, 51, 59, 67, 76 and 81-89 wherein said insulating surface comprises a silicon oxide.

91. (New) A method according to any one of claims 26, 34, 42, 51, 59, 67, 76 and 81-89 wherein a concentration of said metal in said crystallized semiconductor film is not higher than $5 \times 10^{18}$ atoms/cm$^3$.

92. (New) A method according to any one of claims 26, 34, 42, 51, 59, 67, 76 and 81-89 wherein a dose amount of said phosphorus is a range from $1 \times 10^{14}$ to $1 \times 10^{17}$ /cm$^2$.

93. (New) A method according to any one of claims 26, 34, 42, 51, 59, 67, 76 and 81-89 wherein said semiconductor film is provided by a plasma CVD method.

94. (New) A method according to any one of claims 26, 34, 42, 51, 59, 67, 76 and 81-89 wherein said semiconductor film is provided by a low pressure CVD method.

95. (New) A method according to any one of claims 26, 34, 42, 51, 59, 67, 76 and 81-89 wherein said semiconductor film is provided by a sputtering method.

96. (New) A method according to any one of claims 81-89 wherein said heating is conducted within a temperature from 500°C to 800°C.

97. (New) A method according to any one of claims 81-89 wherein said device is a photoelectric conversion device.

98. (New) A method according to any one of claims 81-89 wherein said heating is conducted for 1-4 hours.